

AEROSPACE

Frontiers

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Astronauts Test Glenn-developed Exercise Harness



Photo courtesy of NASA

Bob Thirsk (Canadian Space Agency) exercises with the Glenn Harness aboard the International Space Station during Expedition 21.

For astronauts living on the International Space Station, getting a good workout is equally—and in some ways even more important—than for earthbound people.

"Crew members exercise for a host of important reasons. There's a psychological benefit to exercise, and crew members work out to combat space flight deconditioning—to help fend off the bone loss that they experience in microgravity and to help maintain muscle strength and cardiovascular endurance. All of these things are adversely affected by long-duration space flight," said Gail Perusek, Glenn's manager for the Exercise Physiology and Countermeasures Project.

The current types of treadmills on the space station use an exercise harness that astronauts use to attach themselves to the treadmill while running in space due to the lack of gravity. The harness prevents them from floating off the machine, provides friction against the treadmill belt as they run and exerts an external load, or force, on their body to simulate the resistance of gravity that a terrestrial workout would naturally provide.

The current harness, which has been in use for several years, has some drawbacks. It isn't comfortable and has limited adjustability. Some crew members have reported chafing, as well as pain in their hips and shoulders from using the harness. As a result, the astronauts are not loading their bodies to the optimal amount needed to maintain muscle and bone health. The thinking is, the more load applied to an astronaut while running (ideally the equivalent of their full body weight on Earth) the better the

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Glenn Merits 18 Space Act Awards

Innovation that enhances NASA's ability to preserve preeminence in Space Communications dominated the Glenn-developed technologies that received over \$221,000 in Space Act Monetary Awards in Fiscal Year 2009.

Space Act awards are determined by the agency's Inventions and Contributions Board (ICB). The board makes recommendations for waiving property rights in inventions and for monetary awards—up to \$100,000 per base technology in accordance with the provisions of the National Aeronautics and Space Act of 1958—to any person making a significant scientific or technical contribution sponsored, adopted, supported or used

by NASA to develop or conduct aeronautical and space activities.

The following are 18 FY09 Glenn-developed technologies, including those meriting NASA's "best of the best" Exceptional Award recognition, as well as Software of the Year or Invention of the Year honors:

***Planar Particle Imaging Doppler Velocimetry** by Dr. Mark Wernet, Communications, Instrumentation and Controls Division.

***Radio Frequency (RF) Telemetry System for Implantable Bio-MEMS Sensors** by Dr. Felix Miranda and Dr. Rainee Simons, Communications, Instrumentation and

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Polymers Experiments Yield Valuable Data

This past November, members of the Space Environment and Experiments Branch and local students received a special delivery from the International Space Station (ISS).

The package was Glenn's Stressed Polymer Erosion and Contamination Experiment (PEACE) Polymers experiment, flown as part of the Materials International Space Station Experiment 6 (MISSE 6). MISSE is a series of flight experiments that are mounted on the exterior of the ISS, exposing thousands of material samples and devices to the space environment. MISSE 6 included both active and passive experiments. When retrieved from space, researchers test the samples, such as the passive samples in Stressed PEACE Polymers experiment, for their long-term durability in the harsh environment of space.

PEACE is a collaboration between students at Hathaway Brown School for girls in Shaker Heights and Glenn researchers that began in 1998 and has continued through the years. Through the collaboration, students have been able to perform research in a professional environment, attend international



Photo by Doreen B. Zudell

Researchers and students examine PEACE materials flown outside the ISS. Pictured, left to right: Aobo Guo, Claire Ashmead, Karen Inosbata and Arielle Stambler with Glenn researchers Bruce Banks and Kim de Groh.

conferences and co-author technical papers. In addition, the students have entered their NASA research in prestigious national and international science fairs and have won scholarships and awards. Students will now analyze the latest retrieved samples to determine how well they withstood the space environment.

Data derived from the Glenn-Hathaway Brown collaboration has proven to be a valuable resource in the field of spacecraft materials in and outside of NASA.

—BY DOREEN B. ZUDELL

Glenn-Developed Treadmill Harness

Continued from page 1

workout; it increases the health benefits and decreases health risks.

"Bone loss occurs at a more rapid rate in space than it does on Earth," Perusek said. "In space, astronauts don't get nearly the same amount or quality of repetitive loading as we do here on earth, and bone mineral density loss occurs when the skeleton is unloaded."

The need for a new treadmill harness that is more comfortable and effective inspired the development of a new harness by NASA Glenn. This effort, undertaken in collaboration with the Cleveland Clinic and funded by the Human Research Program at NASA's Johnson Space Center, resulted in the creation of a new harness design called the Glenn Harness. The team also developed custom instrumentation to measure the loads on the harness during exercise. Two Glenn Harnesses have already been tested by space station crew members on orbit during Expedition 21, in a study called the Harness Station Development Test Objective, or Harness SDTO. Additional harnesses will soon be tested on the station by different crew members.

"At Glenn, we have an Enhanced Zero-gravity Locomotion Simulator (eZLS) where we can simulate zero-g treadmill exercise with human subjects," Perusek said. "We tested the prototype harness design in our simulator and determined that indeed the harness was more comfortable than the new harness in a side-by-side comparison on the eZLS, and was able to distribute loads more evenly."

The in-flight study is expected to continue through November 2010 on Expedition 24, and encompass the results from up to seven participating crew members.

Glenn's Web Content Creator Tori Woods, SGT/Community and Media Relations Office, has written a detailed article on this project. Visit <http://www.nasa.gov/centers/glenn/shuttlestation/station/harness.html>.

Reminder: Scientific and Technical Information cannot contain PII

Protected Personally Identifiable Information (PII) must not be included in scientific and technical information (STI) for release external to the agency or sent to the NASA Center for Aerospace Information (CASI). See the PII FAQ at http://insidenasa.nasa.gov/ocio/information/info_privacy/pii_faq.html.

Information on NASA Privacy Policies can be found at http://insidenasa.nasa.gov/ocio/information/info_privacy/index.html. If you have questions about PII or protected vs. public PII, please contact the Glenn Privacy Manager Shirley Anderson at 3-5307 or Shirley.A.Anderson@nasa.gov.

If protected or public/protected combination PII has been released, immediately contact Shirley Anderson and Sue Butts, Glenn STI Manager. If you believe the PII has been sent to CASI for dissemination, please contact the NASA STI Program Office, George Roncaglia (757-864-2374) or Lynn Heimerl (757-864-2343) so that appropriate steps may be taken. If you must notify us via email, please be sure to encrypt the information and email with PKI Entrust.

Space Act Awards

Continued from page 1

Controls Division. This technology was a Glenn nominee for Government Invention of the Year.

***Exfoliation of Layered Silicate Clays by Co-Ion Exchange of an Alkyl Ammonium Ion and a Mono-Protonated Aromatic Diamine for Synthesis of High Temperature Polymer Nanocomposites** by Sandi Miller, Structures and Materials Division.

***Lithium-Ion Cell Charge Control Unit** by Concha Reid and Michelle Manzo, Power and In-Space Propulsion Division; Robert Button, Avionics & Electrical Systems Division; and Russel Gemeiner, QSS (deceased).

***Atomized Barium Fluoride-Calcium Fluoride** by Dr. Malcolm Stanford and Dr. Chris Dellacorte, Structures and Materials Division.

***Intrinsically-Safe Fiber Optic Gas Vapor Sensor for Aircraft Fuel Tank Fire-Safety** by Dr. Quang-Viet Nguyen, Space Processes and Experiments Division. This technology was an Exceptional Award winner and Glenn nominee for Government Invention of the Year.



Dr. Nguyen

***Composite Containment Case for Turbine Engines** by Dale Hopkins and Gary Roberts, Structures and Materials Division;



Photo by Marvin Smith

Left to right: Drs. Harry Rowland, Endotronic, Inc., discussing the RF Telemetry System technology with Miranda and Simons.

Stephen Mitchell, Donald LaChapelle and Ming Zie, GE; and Mike Braley, APSI.

***vMetrics-Compact, Wireless, Highly Configurable, Biometric Real-Time Monitoring System** by Brad Humphreys and Alan Chmiel, ZINT/ISS and Human Research Project Office. This technology won Glenn's Exceptional Award.

***Cup Cylindrical Waveguide Antenna** by NASA's Dr. Roberto Acosta with Kevin Lambert and Carol Kory, ANLX, Communications, Instrumentation and Controls Division.

***Engine Performance Deterioration Mitigating Control Retrofit Architecture** by Dr. Sanjay Garg and Jonathan Litt with Thomas Sowers, ANLX/Communications, Instrumentation and Controls Division.

***Commercial Modular Aero-Propulsion System Simulation** by Jonathan Litt, Communications, Instrumentation and Controls Division; Jonathan DeCastro, Impact Technologies; and Dean Frederick, Saratoga Control Systems Inc.

STS-129's Ohio Connection

Commander Charlie Hobaugh from North Ridgeville and Mission Specialist Mike Foreman from Wadsworth were part of the STS-129 11-day mission that delivered 14 tons of vital equipment to extend the life of the International Space Station. The payload included a Plasma Contactor Unit housing the Glenn Hollow Cathode Assembly; the new Glenn Harness for treadmills; the Communications Interface Board, designed to interface with the next segment of the Materials International Space Station Experiment, MISSE 7; and special glass test tubes for Glenn's heat transfer experiment. For more information on STS-129, visit http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/sts129/overview.html.



Photo courtesy of NASA

Pictured, left to right: Foreman, Hobaugh, Leland Melvin and Bobbie Satchler prior to the first of three extravehicular activities during the STS-129 mission.

***Integrated On-Line and Off-Line Diagnostic Approach for Aircraft Engine Health Management** by NASA's Don Simon, Communications, Instrumentation and Controls Division; and Takahisha Kobayashi, Federal Aviation Administration.

***Wide Temperature Range Sensors With Hi-Level Pulse Train Outputs** by Richard Patterson with Ahmad Hammoud, ASRC/Space Environment and Experiments Division.

***A Radio Frequency Tank Eigenmode Sensor for Propellant Quantity Gauging** by Dr. Greg Zimmerli, Power and In-Space Propulsion Division; Karl Vaden, Communications, Instrumentation and Controls Division; and David Buchanan, Jeffrey Follo, Michael Herlacher, ANLX, and James Wagner, Avionics and Electrical Systems Division.

***Simplified Pulsed Detonation Engine Performance Code** by Dr. Daniel Paxson, Communications, Instrumentation and Controls Division, with Gregory Bruening, Air Force Research Laboratory.

***Thin Film Heat Flux Sensor of Improved Design** by Gus Fralick and John Wrbanek, Communications, Instrumentation and Controls Division; with Charles Blaha, JSV, and Jose Gonzalez, GLCR, Testing Division.

***L-3 ETI Model 2300HE High Efficiency Space Traveling-Wave Tube Amplifier for NASA's Lunar Reconnaissance Orbiter Spacecraft** by NASA's Dr. Rainee Simons and Dale Force, Communications, Instrumentation and Controls Division; Todd Peterson, Advanced Flight Projects Office; and Paul Spitsen, L-3 Communications Electron Technologies, Inc.

***Nondestructive Evaluation Wave and Image Processor Software** by Don Roth, Communications, Instrumentation and Controls Division. This technology won an Exceptional Award and was Glenn's nomination for Software of the Year.

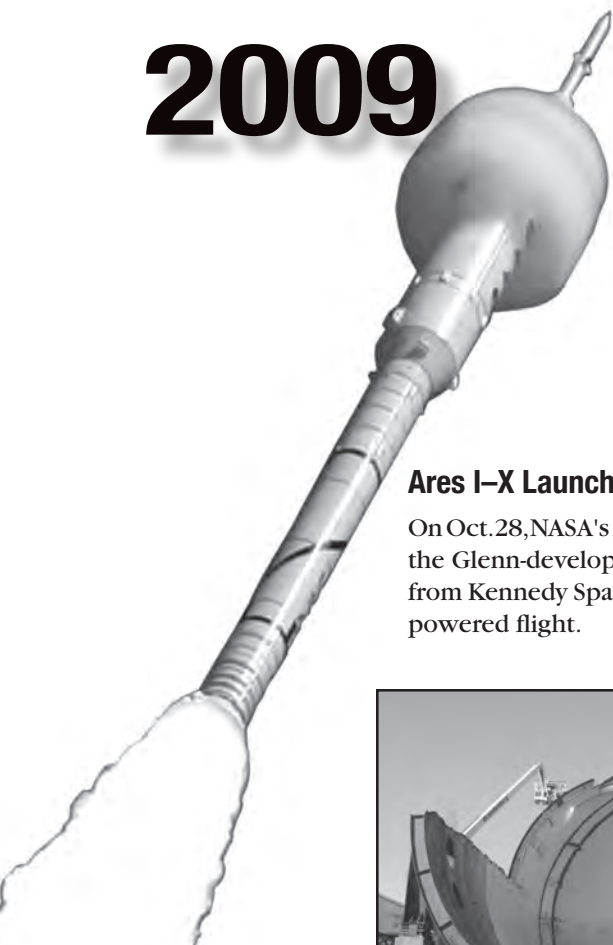


Roth

Glenn innovators interested in applying for a Space Act Award should complete NASA Form 1329 and submit it to Laurel Stauber, Glenn's awards liaison officer.

—BY S. JENISE VERIS
AND CYNTHIA DREIBELBIS

2009 Year In Review



Studying the Moon

Glenn delivered the traveling wave tube amplifier for the Lunar Reconnaissance Orbiter that launched on June 18 as the first mission in NASA's Vision for Space Exploration.



Ares I-X Launch

On Oct. 28, NASA's Ares I-X test rocket, which included the Glenn-developed upper stage simulator, lifted off from Kennedy Space Center for a successful 2-minute powered flight.



AWT Demolition

The massive demolition of the Altitude Wind Tunnel involved the removal of 5 tons of steel (which was all recycled). Idle for 25 years, the tunnel played a major role in aerospace history.



Photo by Michelle Murphy

C-2009-4684

Post-Crew Visits

Crew members representing space shuttle missions STS-119, 125, 126 and 128 and International Space Station Expedition 18 visited Glenn last year. Pictured, front, center, are STS-128 crew members Kevin Ford and José Hernández.

Combined Federal Campaign

Glenn employees showed their support and generosity during the 2009 Combined Federal Campaign by donating a record-breaking \$438,477.



Photo by Bridget Caswell

C-2009-3377



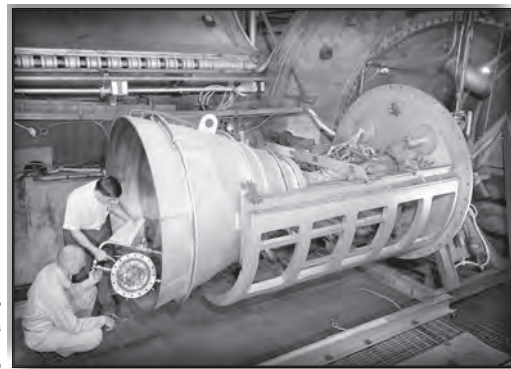
Facilities Master Plan

Several highly visible construction activities, many associated with the initial execution of the Glenn Facilities Master Plan, got underway at Lewis Field and Plum Brook Station.



Apollo 11 Anniversary

Glenn looked back at its rich contributions to the Apollo era and Apollo 11 40th Anniversary and ahead as we prepare to return to the moon.



Large-Scale Models

The Hybrid Wing Body model joined three Constellation Program hardware models at Lewis Field. All four models showcase Glenn's role in the research, design and development of NASA projects that address the nation's future goals in air and space.



Photo by Susan Santos, Focus Group



Photo by Marvin Smith

C-2009-3815

PBS Retirees Reunite

Nearly 125 retirees came together to reminisce and learn about Plum Brook Station's (PBS) current and future activities during the PBS Retiree Reunion in September.

PBS Reactor Decommissioning

After 11 years, NASA's Plum Brook Reactor Facility Decommissioning Project entered the final stages of its massive effort to safely and effectively decommission its nuclear reactor complex.

Cultural Improvement Process

In January, the center held an All Hands Cultural Improvement Forum to update employees on activities underway to help build a stronger, healthier work environment.



Photo by Marvin Smith

C-2009-216



Photo by Bridget Caswell

C-2009-3000

Center Picnic

An estimated 1,150 employees gathered at the Lewis Field Picnic Grounds for the NASA Glenn Center Picnic in August.

Guerin Management Center

Glenn welcomed the addition of the Guerin Management Center on the site of the original Guerin House at Lewis Field in July. The facility offers flexible meeting space in a casual setting for Glenn personnel.



Photo by Marvin Smith

C-2009-2059

Spreading Good Will Towards All

In December, Glenn staff at both Lewis Field and Plum Brook Station (PBS) took some time to spread holiday cheer amongst themselves, and also to those in need in their community.

On Dec. 10, employees attending the Center Holiday Gathering spent time with their coworkers, enjoyed refreshments and played a "Who Said That" game designed to match quotes with senior managers. At PBS, the P3 Committee coordinated a holiday potluck on Dec. 17, which featured entertainment by Ray Sajka.

Charitable Giving

To make the holidays a little easier for those less fortunate, Glenn held toy and clothing drives in November and December.

At Lewis Field, the Veterans Awareness Committee (VAC) sponsored a Marine Corps Reserve Toys for Tots campaign, which netted ten boxes of toys and a check for \$344 raised during the annual PACE Employee Holiday Party. Sandusky-area children also benefited from the Toys for Tots campaign, as several boxes of toys were donated by PBS staff.

In addition to toys, Glenn employees collected gently used clothing, shoes and canned food items for local charities to help area homeless. The IFPTE Local 28, LESA union, Glenn's advisory groups and



Photo by Rafael Sanabria

During the Center Holiday Gathering, employees dressed in red posed for a group shot.



Photo by Doreen B. Zudell

Employee volunteers loaded the 300-plus bags and boxes for the City Mission.



Photo by P3 Committee

Pictured: P3 Committee members Carla Matthews, left, and Cindy Freeb packing donations.



C-2009-4622

Photo by Bridget Caswell

Pictured with US Marine Sgt. Tyrone Payne, center, are, left to right, VAC's Shawn Abbott, Gloria Richards, Tom Hartline, Joan Emmett, Vanessa Easterling, Rick Reames and DB Consulting PACE Program Manager Ron Harvey.

Prayer Group—with the help of employees throughout the center—collected and loaded 300-plus bags and boxes of items on a truck bound for the City Mission in Cleveland.

Thanks to all who contributed to Glenn's charitable giving activities this year!



C-2009-4559

Photo by Michelle Murphy

Celebrating Diversity

Employee knowledge on the concept of diversity—beyond the norms of race, gender and age—expanded during Glenn's inaugural Diversity Day Celebration on Dec. 2. Keynote speaker Dr. Julian Earls, Executive-in-Residence at Cleveland State University and former center director, gave an interactive presentation on the importance of "diversity of communication." Also featured throughout the day were Glenn Advisory Groups, a variety of vendors and additional presentations addressing racial inclusion and the issue of Fair Trade as it relates to managing the diversity of a global workforce. The event was sponsored by Glenn's Diversity Management Office and the Diversity Management Committee. Pictured, left to right: Dr. Earls; Lynda Glover, Diversity Management Office and event chairperson; and Charles Doxley, Flight Communications Branch.

People



Greenbauer-Seng



Hickman



Dr. Misra



Tolbert

Leslie Greenbauer-Seng was appointed deputy chief of the Structures and Materials Division, where she has served in an acting status since March 2009. Greenbauer-Seng previously served as a deputy chief for the Communication, Instrumentation and Controls Division.

J. Mark Hickman was selected Combustion Integrated Rack (CIR) Payloads Project Manager, ISS and Human Research Project Office. Hickman most recently served as project lead engineer for Glenn's ISS and Human Research Project Office.

Dr. Ajay Misra was selected chief of the Structures and Materials Division. Misra previously served as deputy division chief for the division.

Carol Tolbert was selected Ares Purge and Hazardous Gas Detection Project Manager in the Launch Systems Project Office. Tolbert previously served as Glenn's Ares I Upper Stage Structures and Thermal lead.

BPW Awards Career Advancement Scholarship



Photo by Suzanne Aldrich

Pictured, left to right: Anderson, Nawash and Marrero.

The NASA Glenn Chapter of the Business and Professional Women (BPW) has awarded the 2009 Career Advancement Scholarship to Angela Anderson, a co-op student in the Program Resources Analysis Division. NASA Glenn BPW president Nuha Nawash, ASRC/Avionics and Electrical Systems Division, presented a \$500 check to Anderson who is attending the University of Pittsburgh for a degree in finance with an International Business Certificate and French minor. The Chapter also awarded a \$100 Honorarium Scholarship to Mindy Marrero, ASRC/Systems Verification Branch, who graduated from Kent State University with a degree in Business Management.

DEADLINES

News items and brief announcements for publication in the February issue is noon, Jan. 22. Larger articles require at least 1 month notice.

<http://aerospacefrontiers.grc.nasa.gov>



Hermes Award



AWARDS FOR PUBLICATION EXCELLENCE

In Appreciation

I extend my sincere thanks to all my friends and colleagues who donated leave due to my recent surgery. I am overwhelmed. This truly is a NASA Family.
—Donna Rizer

Retirements

John Brodowski, Fabrication and Instrumentation Branch, retired on January 1, 2010, with 35 years of NASA service.

Calendar

AFGE MEETING: AFGE LOCAL 2182 will hold its next membership meeting on Wednesday, Feb. 3 at 5 p.m. at Denny's Restaurant, 25912 Lorain Road, North Olmsted.

IFPTE LOCAL 28, LESA MEETING: LESA will hold its next membership meeting on Wednesday, Feb. 10 at noon in the Small Dining Room of the Employee Center, building 15.

NASA RETIRED WOMEN'S LUNCH: The next luncheon will be at Donauschwaben's German American Cultural Center, 7370 Columbia Road in Olmsted Falls on Thursday, Feb. 18 at noon. Please call Gerry Ziemba at 330-273-4850 with your reservation.

In Memory

Edward N. Hejnal, 71, who retired in 1994 with 31 years of NASA service, died Dec. 11. Prior to retirement, Hejnal served as Research Facility Service Manager in the Test Installation Division. He also served in the U.S. Marines for 4 years.



Hejnal

CORRECTIONS

IN THE DEC. 2009 ISSUE, PAGE 6: "Astronauts Bring Silver Snoopy Awards" article, David Morgan is identified with the wrong organization. The correct organization is Program and Project Assurance Division (QE).

The correct order of the AIAA Associate Fellows pictured: Seated, left to right: Rodriguez, Dr. Urban, Dr. Bakhle and Dr. Lawrence. Standing, left to right: Miles, Giel, Cikanek and Dr. Ashpis.

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Editor: **Doreen B. Zudell**, SGT, Inc.
Assistant Editor: **S. Jenise Veris**, SGT, Inc.
Managing Editor: **Kelly R. DiFrancesco**



Camp Aerospace Connects with Middle School Students

For most middle school age children, learning about careers in the fields of science, technology, engineering and mathematics (STEM) is not as compelling as watching music videos or updating their social network profiles. Members of Glenn's 2009 FIRST (Foundations of Influence Relationships Success and Teamwork) class, however, found a way to connect with some of these hard-to-reach "tweens" through hands-on workshops at Plum Brook Station (PBS).

On Nov. 6, students from Briar Middle School in Sandusky participated in Camp Aerospace at PBS with special guest, astronaut and Ohio native Sunita (Suni) Williams. The 1-day workshop revolved around hands-on activities in the STEM areas, specifically designed to encourage teambuilding and advance problem-solving skills, and included a tour of PBS facilities.

Camp Aerospace is the product of Glenn's five-member NASA FIRST class, consisting of Lindsey Flash, Jennifer Nappier, Robert Overy, Raquel Redhouse and Steven Sinacore. NASA FIRST targets some of the agency's most promising professionals by focusing on developing leadership capabilities and intra-agency collaboration.

Over the course of a year, in addition to FIRST agencywide meetings and workshops, the group planned and conducted six pilot sessions of Camp



Photos by Robert Overy

Aerospace at PBS with select students leading up to the November event. While promoting STEM-related fields FIRST members also dispelled misconceptions and offered realistic information about NASA and technical careers.

"It was great meeting and talking with the kids," Overy said. "I think we helped them see that we are real people who were once kids just like them, and that they can succeed through opportunities in STEM-related careers as well."

With the encouragement of NASA Administrator Charles Bolden for NASA outreach to students in remote areas, the group took Camp Aerospace on the road to Great Falls, Montana. In November, they conducted the camp for middle school age children in that area.

"Planning and conducting Camp Aerospace demanded a lot of time and effort on the part of our group," Flash said,



Above, left, Sinacore oversees Our Lady of Lourdes students from Great Falls, Montana, as they set the angle and air pressure to launch paper rockets. Above: Redhouse assists Sandusky Perkins Middle School students in placing their Mars Habitat into the acoustic chamber for testing.

"but the support of center leadership and other areas throughout Lewis Field and Plum Brook Station, as well as educators and community leaders, affirmed our belief in the need for and the value of the project."

Although FIRST participants graduated from the program in December, they will conduct a teacher workshop this month to empower educators to establish their own miniature Camp Aerospace. Through these workshops, FIRST participants and teachers hope to stay connected with the next generation of explorers by other means than a cell phone.

—BY DOREEN B. ZUDELL